

REMARKS

Claims 10-21 are pending in the application. By this Amendment, claims 6-9 have been canceled, and claims 16-21 have been newly added. No new matter has been entered.

In the Office Action dated July 1, 2003, claims 6-9 were rejected under 35 U.S.C. § 102(a) as being anticipated by Shimizu et al. (Japanese Appl. Pub. No. 2000-036484); claims 6-15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Robb (U.S. Pat. No. 4,529,860); and claims 6-15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Robb in view of so-called "Admitted Prior Art." In view of the reasons explained below, Applicants respectfully request reconsideration and withdrawal of these rejections set forth in the Office Action.

REJECTION UNDER 35 U.S.C. § 102(a)

Claims 6-9 were rejected under 35 U.S.C. § 102(a) as being anticipated by Shimizu et al. This rejection is rendered moot by the cancellation of claims 6-9. Thus, reconsideration and withdrawal of this rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. § 103(a)

Claims 6-15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Robb. In addition, claims 6-15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Robb in view of so-called "Admitted Prior Art." In view of the following reasons, Applicants respectfully request reconsideration and withdrawal of these rejections.

Independent claim 10 recites a method of etching an organic film. The method includes, among other things, "pressurizing the process chamber to a pressure equal to

or higher than 500 mTorr,” “etching the organic film,” and “stopping the etching before the etching goes through the organic film.” Similarly, independent claim 12 recites a method of etching an organic film comprising, among other things, “pressurizing the process chamber to a pressure between 500 - 800 mTorr,” “etching the organic film,” and “stopping the etching before the etching goes through the organic film.” As detailed below, Robb, either taken alone or in combination with any other cited reference, discloses, teaches, or suggest the above-mentioned method steps of claims 10 and 12.

Robb discloses a method of anisotropically etching an organic material with an overlying patterning mask for reducing mask undercutting. Robb, however, does not disclose a step of “pressurizing the process chamber to a pressure equal to or higher than 500 mTorr,” or “between 500 - 800 mTorr,” as recited in claims 10 and 12, respectively. Instead, the method of Robb teaches a pressure ranging from about 13.3 Pa (=97.8 mTorr) to about 53 Pa (=398.8 mTorr). Worth noting is that, while Robb parametrically varies the pressure from 13 Pa (=97.8 mTorr) to 66.5 Pa (498.8 mTorr) for the purpose of measuring the etch rate and anisotropy of undercutting, the pressure range still does not fall within the Applicants’ claimed ranges of pressure.

Nevertheless, the Examiner asserts, relying on col. 1, lines 21-22, of Robb, that Robb “presumably encompasses pressure greater than 500 mTorr.” Applicants respectfully disagrees with this allegation. Col. 1, lines 21-23, states that “[c]urrent wet chemical as well as high pressure plasma etch processes for polyimide, however, produce lateral etching which, at best, is proportional to the vertical etch depth.” As is apparent, there is absolutely nothing in this text that suggests the “high pressure” encompasses a pressure greater than 500 mTorr. Nor does it suggest that Robb is

using this high pressure plasma etch process, because the text, at best, teaches against the use of such a high pressure plasma etch process due to its lateral etching problem. Therefore, the Examiner's assertion that Robb "presumably encompasses pressure greater than 500 mTorr," cannot be supported.

Furthermore, the Examiner alleges that Robb teaches a result-effective variable and, therefore, it can be optimized. Applicant respectfully disagrees with this allegation.

The fact that a variable merely affects a result does not automatically qualify the variable as a result-effective variable. Any given variable, as a matter of laws of nature, affects in one way or another some result. For example, a pressure always affects temperature. At any given condition, a change in pressure almost always changes temperature, yet it is incorrect and illogical to assume that a pressure is always a result-effective variable. With respect to defining a result-effective variable, M.P.E.P.

§ 2144.05 II.B provides the following specific guidelines:

"[a] particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." (Emphasis supplied by Applicants).

That is, in order for a variable disclosed in a prior art reference to be considered a result-effective variable (which can arguably be optimized to meet the claimed range), the result with which Applicants obtain with the claimed variable range must necessarily be recognized from the disclosure in the prior art reference, so that the optimum or workable ranges of the variable can be obtained via routine experimentation. If, on the other hand, the result with which Applicants obtain with the claimed range of the variable were different from, or not recognized by using the disclosure of the prior art

reference, the teachings of the prior art reference cannot possibly obtain the same optimum or workable ranges of the variable through routine experimentation, because the prior art teaching would most likely arrive at a result distinctly different from that of the Applicant's claimed invention.

In this case, Applicant is attempting to obtain flat shape of contact holes. To do so, Applicants, among other things, pressurize the process chamber to the claimed range (i.e., ≥ 500 mTorr or $500 \sim 800$ mTorr) as the optimum pressure range for obtaining the flat shape of the contact holes. Therefore, in order for the pressure in Robb to be considered as a result-effective variable and thereby be optimized to meet the claimed pressure ranges, Robb must have necessarily attempted to obtain the same result as that of Applicants' or at least recognized the result which Applicants' are attempting to achieve. Robb, however, neither attempts to obtain the same result as that of Applicants nor recognizes the result the Applicants obtained. Instead, Robb merely varies the pressure parametrically to measure etch rate and anisotropy of mask undercutting at different pressure. Not surprisingly, Robb then determines that the optimal pressure range is between 13 Pa (=97.8 mTorr) and 53 Pa (=398.8 mTorr), i.e., different from the Applicants' claimed range. For at least this reason, Applicants respectfully submit that the pressure disclosed in Robb cannot qualify as a result-effective variable. Therefore, one of ordinary skill in the art would not have arrived at the Applicants' claimed pressure range through routine experimentation based on the disclosure of Robb.

In addition, with respect to the recited step of "stopping the etching before the etching goes through the organic film," the Examiner asserts that Robb teaches in col.

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2, lines 52-54 that "the etch[ing] can be conducted to a 'predetermined amount'". In support of this assertion, the Examiner takes an official notice that "it is a known technique to form various profiles in substrates by sequentially etching with different parameters and compositions which encompasses stopping the etch before breakthrough." The Examiner then asserts that "it would have been obvious [...] to stop the etch before the etching goes through the film in the method of Robb because a predetermined amount can include part-way etching through to optimize the etch for best results in the final product." Applicants respectfully disagree with these assertions.

Applicants do not dispute the fact that there can be certain etching processes that utilize multiple etching steps. However, those processes generally involve some particular reasons for doing so. In this case, however, Robb plainly suggests only a full etching of the organic layer to reduce mask undercutting, which is typical in an etching process and is consistent with the entire disclosure of Robb, and there is no apparent reason why one of ordinary skill in the art would be motivated to employ an inherently more cumbersome multi-step process. The Examiner merely asserts that a multi-step process would "optimize the etch for best results in the final product" without explaining how and in what manner the etch in Robb can be optimized. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, In re Vaeck, 947 F.2d 488 (Fed. Cir. 1991), and the evidence of a teaching, suggestion, or motivation to combine must be "clear and particular." In re Dembiczak, 175 F.3d 994, 999 (Fed. Cir. 1999). Therefore, the motivation suggested by the Examiner cannot be supported, because it is not found

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either in Robb itself or in the knowledge generally available to one of ordinary skill in the art.

Furthermore, consistent with the Robb's entire disclosure, the vague term "predetermined amount" in col. 2, lines 53-54, should be construed as meaning, for example, etching through the organic layer up to the substrate, rather than to interpret it to include "part-way etching," as suggested by the Examiner. This is the only valid construction of that term, because there is simply no other alternative meaning suggested by Robb.

Therefore, even if a multi-step etching process were available, there would not have been any reason why one of ordinary skill in the art would be motivated to employ such a multi-step etching process, because the method of Robb would not need such a multi-step etching process.

At least for the reasons set forth above, independent claims 10 and 12 are patentably distinguishable from Robb and the other cited prior art references. Accordingly, Applicants respectfully request reconsideration and withdrawal of all of the rejections under 35 U.S.C. § 103(a).

If the Examiner continues to reject the claims based on Robb, Applicants respectfully request that the Examiner supply a secondary reference under official notice and set forth a detailed explanation as to how that reference, in combination with Robb, creates a *prima facie* case of obviousness under 35 U.S.C. § 103(a).

Applicants respectfully request the reconsideration of this application, the withdrawal of all the outstanding rejections, and the allowance of claims 10-21.


The Office Action contains a number of statements and characterizations regarding the claims and the related art. Applicants decline to subscribe to any statement or characterization in the Office Action, regardless of whether it is addressed above.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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ATTACHMENTS

- Replacement Sheet for Fig. 4

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